

# Appendices

## APPENDIX 1: Existing Notable 3<sup>rd</sup> Party Standards

### A.1a LEED (Leadership in Energy and Environmental Design) for Mid- to High-Rise Residential, Commercial, Institutional and Industrial Buildings and Sites

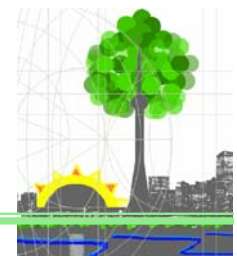
The LEED Green Building Rating System® is a voluntary standard, developed by the United States' Green Building Council (GBC), for developing high-performance, sustainable buildings. LEED has been developed, and continues to be refined, by the GBC's members, who represent all sectors of the building industry in a consensus-based process.

The LEED system is a rating system that provides points for building features that fall into six categories: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Air Quality, and Innovation and Design Process. LEED has certain prerequisites that must be met for certification, along with numerous optional credits for each category, which earn the building additional points. The number of points a building earns determines its LEED rating. The LEED ratings are levels of achievement, which include basic LEED certification, LEED Silver, LEED Gold, and finally, LEED Platinum as the highest level.

To achieve LEED certification, buildings must undergo a thorough third party verification process that all intended features have been implemented and are working according to plan. A building receives certification only after the construction and commissioning process is complete.

LEED for New Construction and Major Renovations (LEED-NC) is a green building rating system that was designed for commercial and institutional projects, with a focus on office buildings. Practitioners have also applied the system to K-12 schools, multi-unit residential buildings, manufacturing plants, laboratories and many other building types.

In recent years, the Canada Green Building Council (CaGBC) has developed LEED Canada for New Construction and Major Renovations version 1.0. This is an adaptation of the US LEED, and has been tailored specifically for Canadian climates, construction practices and regulations.



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The US GBC has also developed LEED rating systems for Existing Building Operations and Commercial Interiors Projects. It is in the process of developing LEED rating systems for Core and Shell Projects, Homes, and Neighbourhoods.

## **A.1b Green Globes for Mid- to High-Rise Residential, Commercial, Institutional and Industrial Buildings and Sites**

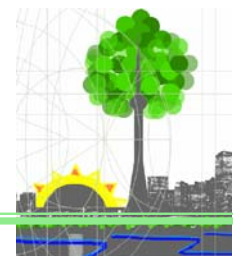
Green Globes is an online assessment tool that evaluates and rates the environmental performance of new and existing buildings, as well as interior fit-ups. It can be applied to all types of medium to large sized buildings and sites. Green Globes also functions as a design guide to assist design professionals to integrate green principles through the project delivery stages. It is based on an on-line questionnaire of approximately 150 questions. Green Globes considers education in environmental design principles to be a key part of the process in building green.

Actual assessment occurs at both the design and construction phase, which parallel the development approval process, in order to allow municipal authorities to verify that environmental claims are being met as the project develops. A preliminary score is provided at the design stage, and the score is finalized at the completion of contract documents. The system can be self-administered, but official certification requires engaging a third party to verify the design.

The Green Globes rating system has seven areas of building environmental performance, which form categories under which all building features fall. These include: Project Management; Site, Energy; Water; Resources; Emissions, Effluents & Other Impacts; and Indoor Environment. Like LEED, Green Globes assigns points for implementation of each building feature, or meeting specific targets. It has five levels of achievement, ranging from One Green Globe (lowest) to Five Green Globes.

## **A.1C R-2000 for New Homes**

R-2000 is a voluntary national Canadian standard for the construction of new, single-family homes that was developed by Natural Resources Canada's Office of Energy Efficiency. It mainly addresses energy efficiency, but also touches on some other green elements, such as indoor air quality and use of recycled materials. It sets criteria for how a home must perform, allowing the designer and builder to



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choose how to build it. An R-2000 home typically uses 40% less energy than other new homes.

The R-2000 standard has specified requirements, and then has an indoor air quality “pick list” and an environmental “pick list” from which a certain number of features must be chosen. R-2000 requires 2 “environmental features” from the environmental “pick list”.

Builders must be trained in R-2000 to build homes that meet the standard. Licensed R-2000 evaluators are also involved before, during and after construction in verifying that the home meets the R-2000 standard. Final verification includes inspection and air leakage testing.

## A.1d Energy Star for New Homes

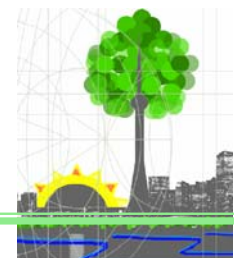
Energy Star for New Homes is also a program of Natural Resources Canada. It applies to all low-rise, residential building types regulated by the Ontario Building Code, Part 9, regardless of building orientation, distribution of windows, building size and eligible heating system. The program’s focus is almost exclusively on energy efficiency. New homes that meet the Energy Star standard will be 40% more energy efficient than homes built to minimum building code standards.

Energy Star for New Homes is in a 2 year pilot phase in Ontario, running until April 1, 2007. The Energy Star system includes Building Packages for two Ontario climate zones, with optional trade-offs for each package to provide the builder with compliance choices. All trade-offs have been pre-determined to meet or exceed specified performance levels.

Energy Star is linked to the EnerGuide program. To be Energy Star qualified, a new home must score 78 on the EnerGuide for new houses scale. To meet the Energy Star standard, homes must undergo third party verification.

## A1e LEED for Homes

LEED for Homes is under development by the US Green Building Council. It is in a pilot phase that was launched in September 2005, with the US GBC currently calling for projects to pilot test the rating system. Like LEED for commercial buildings, the standard has certain prerequisites for certification, along with many optional features which earn credits that raise a home’s LEED rating. The initial phase of the pilot is focusing only on new single family homes



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## APPENDIX 2: Details of Feedback on Implementation Solutions

### A.2 Consultant's Report (Excerpts)

The following are excerpts from the Executive Summary of the Halsall Report, which was Phase 1 of the work on the Toronto Green Development Standard. They provide some of the context for the work undertaken, and summary and analysis of findings.

#### [Methodology]

##### Literature Search

A literature search was carried out to identify comparable municipal initiatives to promote green development. Examples were obtained from over 100 cities and regions on five continents. The idea that cities should promote green building in their jurisdictions is widely accepted throughout much of the world.

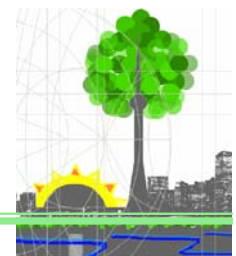
##### Case Studies

The initiatives identified in the literature search were reviewed, and those that appeared to be the most relevant to the City of Toronto were selected for further study. Relevance was based on:

- Similarities in population and density of development;
- Similar Environmental Drivers;
- An overall range of mandatory vs. voluntary approaches;
- A high quality of information available; and
- Apparent success at achieving their stated objectives.

The green development initiatives of 12 cities/regions were selected for further investigation as case studies:

- Canada – Vancouver
- USA - Santa Monica, San Mateo, Minnesota, New York City, Chicago, Portland
- Europe – Berlin, Ealing-UK, Malmö-Sweden, Kalundborg-Denmark
- Asia - Tokyo



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## [Findings and Analysis]

### Summary of Green Building Initiatives and Standards

There is a broad range of initiatives undertaken in the city/regions investigated, but we identified the following common strategies, which were adopted in varying combinations:

- a) Incentives – including cash, expedited approvals, or zoning variances such as increased densities;
- b) Education – including permanent information centres, online resources, help lines, and seminars;
- c) Public Sector Leadership – including mandatory green requirements for all public buildings, publicly funded green demonstration projects or public-private partnership projects; and
- d) Mandatory Requirements – including modified building code and by-law requirements, and mandatory green development standards.

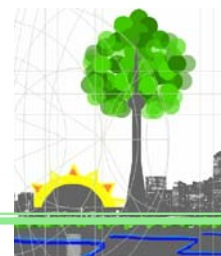
### Regulatory Tools

The different jurisdictions reviewed were obviously working within different regulatory frameworks. As a result, some of the tools used elsewhere are not available to the City of Toronto. The following is a summary of regulatory initiatives used in the Case Studies, with commentary on how they relate to Toronto's opportunities.

#### *a) Building Codes*

A number of cities included in the case studies for this report have the ability to modify their State or Provincial Building Codes to meet local objectives or pass their own Building Codes outright. These cities have used, or are planning to use, their authority to strengthen their Code requirements related to green buildings and green building technologies. This is useful where green development is concerned since most green building initiatives relate to Building Code issues. The City of Toronto does not have this power or authority to require higher standards than exist in the Building Code. This may change with the new C.oT. Act. The cities with these powers include:

- Vancouver (has a Charter which allows it to pass its own Code and is now working to incorporate green building efficiencies into their Code);
- Chicago (has Home Rule, but its Code varies little from the Illinois Code);
- Santa Monica (has modified the California state-wide Building and Energy Efficient Standard to encourage green building);
- New York (includes some limited green development initiatives—have mostly removed obstacles from the Code to achieving green development); and



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- Malmö, Sweden (which has the ability to modify the National Building Code).

## *b) Re-Zoning*

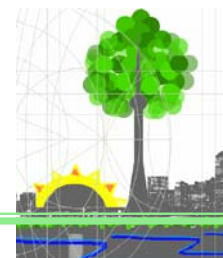
Development proponents can apply for a rezoning and/or an Official Plan amendment to obtain permission to proceed with development that does not meet all of the provisions of the Zoning Bylaw, and in some cases the Official Plan. The rezoning process (which includes site plan control) provides municipal staff with the authority they would otherwise not have to require and achieve green development initiatives. This power is used routinely in Vancouver and Santa Monica to achieve green development initiatives, over and above other requirements (for example, achieving a LEED® Gold building). In Toronto, green building initiatives do not appear to be routinely either sought or secured as part of the rezoning and/or Official Plan amendment process. To do this would require training staff, or providing technical support related to green building initiatives, or a combination of the two.

## *c) “Discretionary” Zoning*

A number of cities have introduced a type of discretionary zoning where developments are entitled to greater densities over a certain threshold provided a number of public benefits are met. This is similar to using the bonusing authority available to the City of Toronto under Section 37 of the Planning Act, but directly incorporates the process into the Zoning Bylaw (having two density limits in one zone—one purely as of right; the other subject to provision of public benefits). Alternatively, these zones define classes of uses or developments that must be negotiated with City staff. These types of zoning initiatives exist in Vancouver (called discretionary zoning which includes securing environmental improvements as a public benefit) and Chicago (called “planned development” through which some limited green initiatives are secured, including green roofs).

## *d) Site Plan Control*

Many cities have broader authority for site plan control than the City of Toronto. This allows them to secure a greater range of green development initiatives through the approval process than is currently possible in Toronto. For example, Chicago’s “planned development” process, which is really a cross between discretionary zoning and site plan control, provides a broader range of powers, extending beyond the limited powers in Section 41 of the Ontario Planning Act. In the United Kingdom (Ealing), municipalities also have a broader range of discretion when it comes to development control. In Tokyo, the municipality has an extensive authority to require green development initiatives for developments over 10,000 square metres in size.

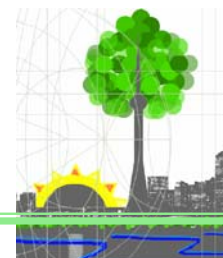


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## Learning Opportunities

All of the Case Studies represent groundbreaking initiatives that have generally been adjusted over time to reflect lessons learned. They create an excellent opportunity for Toronto to learn from other municipalities' experience. We believe the following are key lessons identified in the Case Studies:

- *Use Pilot Projects:* Start with small incremental steps—do not try to do everything at once. Pilot projects are an effective way to get started as they provide opportunities to test ideas and build awareness and comfort in the industry.
- *Engage Stakeholders:* Communicate the objectives and the procedures to all parties involved. Other cities report a higher level of acceptance, particularly from developers, when they were involved in the process of establishing the standard.
- *Educate:* There is a demand at the consumer level for education on green buildings. A number of the Case Studies have some level of education directed at consumers. Santa Monica, in particular, has focused on education and report high levels of participation.
- *Streamline Approvals:* As incentives, developers prefer fast tracked approvals to cash. Santa Monica offered up to \$30,000 in cash to developers for designing to LEED® standards and none of the developers took the incentive. They are soon to offer fast track approvals and have already received a favourable response.
- *Monitor Achievements:* Monitoring city wide environmental indicators provides feedback regarding priorities for a green development initiative. Tracking the indicators provides the rationale for the standard. Some cities used a set of mandatory requirements (simpler to implement) which are focusing on a short list of key Environmental Drivers. Tokyo's is the best example of a city using this strategy. Ealing's checklist also created a simple, targeted test of a development's alignment with the region's sustainability objectives.
- *Competition:* Unique competitions yield marketing and educational benefits, which can lead to political change. San Mateo's Green Dollhouse design competition has generated publicity all across North America. The success of this unusual initiative gave politicians the opportunity to embrace green building.

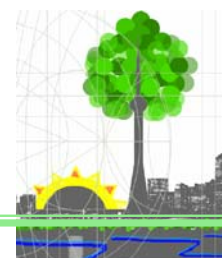


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- *Training:* Active training of City staff is an important component of any initiative. Rezoning applications create an opportunity for the City to raise the bar. However, the Building Department must understand the value to green development issues in order to negotiate rezoning agreements effectively.
- *Visibility:* Visible initiatives such as green roofs and at-grade landscaping have a significant impact on the city's image as a green community. Chicago focused on these highly visible aspects of green building first and generated both public support and recognition. Certain highly visible projects (i.e. fuel cell technology) increase public awareness but may not provide other direct benefits.
- *Show Commitment:* Publicly funded buildings, and the lease or sale of public lands, present opportunities for increasing building performance requirements without the need for regulatory changes. Most of the jurisdictions have implemented some form of increased standards for public buildings. As pilot projects, maintaining ownership allows the City to confirm performance over the long term and fine-tune their standard to be cost effective.

Some specific initiatives related to funding that are probably applicable to Toronto include:

- San Mateo uses a surcharge on landfill tipping fees to fully fund their green building initiative. This initiative could provide an opportunity for Toronto to create budget neutral funding.
- Work with banks to provide better financing rates to buildings that meet the City's performance standard could help to overcome the perception that green costs more. Toronto, being the largest city in the country and home to the head offices of the major banks, seems well suited for exploring such an opportunity.



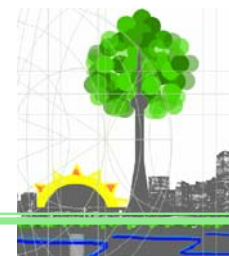
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## A.3 Toronto Area Developer's Survey

In February 2006, Toronto City Planning staff sent an electronic survey to 27 Toronto-area developers to learn about their experiences and concerns with respect to green development. Fourteen developers submitted responses.

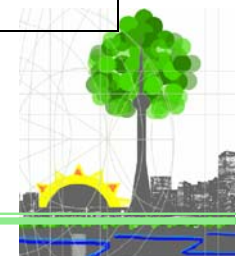
The tables below summarize the survey responses. The survey's questions were grouped in three categories, as per the tables below. The first set of questions addressed the developers' experiences with green development. The second set addressed how the City could encourage green development. The third set addressed the availability of information about green development. The numbers in the tables indicate the number of developers who provided the answer indicated.

| Developers' Experiences  |   |
|--|---|
| Have you considered implementing non-mandatory green measures? | <ul style="list-style-type: none"><li>• Yes: 13</li><li>• No: 1 (Reason: would add to building construction cost)</li></ul> |
| Did you implement any of them?                                 | <ul style="list-style-type: none"><li>• Yes: 8</li><li>• Not yet / in process: 3</li><li>• No: 3</li></ul>                  |



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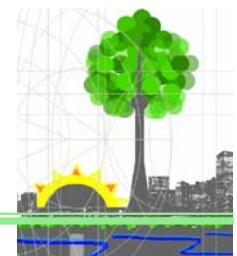
| <b>Developers' Experiences (continued)</b>   |  |
|--|--|
| Which measures have been implemented?<br>(List of all measures mentioned).           | <ul style="list-style-type: none"> <li>• Recycling facilities</li> <li>• Green roofs</li> <li>• Shading devices</li> <li>• Sustainable materials</li> <li>• Upgraded electrics</li> <li>• Energy Management Systems (automation)</li> <li>• Individual metering for suites</li> <li>• Tri-sorter garbage</li> <li>• High efficiency boilers</li> <li>• Motion detectors</li> <li>• Stormwater retention</li> <li>• Energy efficient lighting</li> <li>• Smart meters</li> <li>• Geothermal heating (1 in process; 2 didn't work out)</li> <li>• Deep lake water cooling (in process)</li> <li>• District Energy (in process)</li> <li>• Heat recovery vent (in process)</li> <li>• Dual flush toilets (in process)</li> <li>• Low-flow shower heads (in process)</li> <li>• Low VOC paints &amp; finishes (in process)</li> <li>• High efficiency fans, motors &amp; elevators (in process)</li> <li>• Better window assemblies (in process)</li> <li>• High performance glazing (in process)</li> <li>• Foam insulation (in process)</li> <li>• Car pooling/ autoshare (in process)</li> <li>• High efficiency appliances (in process)</li> </ul> |
| Measures that were considered but didn't work out. (List of all measures mentioned). | <ul style="list-style-type: none"> <li>• Geothermal heating (full conventional backup system required; too much technical risk)</li> <li>• Green roofs (capital cost premium prohibitive; benefits could be achieved through other means)</li> <li>• Solar &amp; PV (cost prohibitive with negligible benefits for highrise)</li> </ul>  |
| Common obstacles faced   | <ul style="list-style-type: none"> <li>• Shortage of knowledgeable consultants</li> <li>• Municipal resistance when lack of familiarity with technology (esp re geothermal heating)</li> <li>• Uncertain risks</li> <li>• Delayed construction</li> </ul>  |



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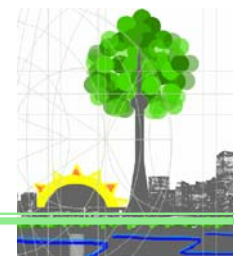
| <b>Developers' Experiences (continued)</b> |  |
|--|--|
| Motivation for implementing green measures | <ul style="list-style-type: none"> <li>• Corporate environmental philosophy: 4</li> <li>• Market demand: 4</li> <li>• Anticipated market demand: 1</li> <li>• Reduced operating costs: 4</li> <li>• Improved design practice: 3</li> <li>• Market leadership: 2</li> <li>• Better value for buyer: 2</li> <li>• Higher energy prices: 1</li> <li>• Tenant requirement: 1</li> <li>• Need to be competitive on certain RFPs: 1</li> </ul> |

| <b>How to Encourage Green Development</b>         |  |
|---|--|
| Best ways for City to encourage green development | <ul style="list-style-type: none"> <li>• Fast-tracking (green team esp for green apps): 7</li> <li>• Tax/DC relief: 6</li> <li>• Educate the market: 5</li> <li>• grants: 3</li> <li>• City take the lead: 3</li> <li>• Section 37: 3</li> <li>• Reduce parkland requirements (for GR): 2</li> <li>• Train City staff so they don't delay/discourage or have a "green team" familiar with tech 1</li> <li>• Reduce parking requirements: 1</li> <li>• Special loans: 1</li> <li>• Set minimum stds that are achievable: 1</li> <li>• Arrange longer mortgages: 1</li> <li>• Offer consumers a financial incentive to drive demand 1</li> </ul> |
| Prefer voluntary or regulatory?                   | <ul style="list-style-type: none"> <li>• Voluntary: 8</li> <li>• Regulatory: 1</li> <li>• Mix: 1</li> </ul>  |



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| Getting information on Green Development                    |   |
|---|---|
| Do you know where to find information on green development? | <ul style="list-style-type: none"> <li>• Yes: 9</li> <li>• No: 2</li> <li>• A bit: 2</li> </ul>   |
| Where do you find information?                              | <ul style="list-style-type: none"> <li>• Consultants (engineers, landscape arch): 8</li> <li>• Internet: 4</li> <li>• Industry/Trade publications: 3</li> <li>• Trade shows/conferences: 2</li> <li>• Canada Green Building Council: 2</li> <li>• Product suppliers: 2</li> <li>• In-house team: 2</li> <li>• Sustainable Building Canada: 1</li> <li>• TRCA: 1</li> <li>• Ask around the industry: 1</li> <li>• Contractors: 1</li> <li>• City of Toronto webpage: 1</li> <li>• Municipal staff: 1</li> </ul>                      |
| Is there a shortage of info?                                | <ul style="list-style-type: none"> <li>• Yes: 7</li> <li>• No: 6 (but some concerns about reliability of info)</li> </ul>   |
| Types of info needed:                                       | <ul style="list-style-type: none"> <li>• Statement of what constitutes a green building: 4               <ul style="list-style-type: none"> <li>- Meaningful, achievable targets</li> <li>- Incentive-based flexible framework</li> <li>- Based on performance</li> </ul> </li> <li>• Case studies (especially local): 3</li> <li>• <u>Objective</u> data on cost vs benefits, risks, reliability: 3</li> <li>• Practical resource centres: 1</li> <li>• List of qualified consultants: 1</li> <li>• Supplier options: 1</li> </ul> |



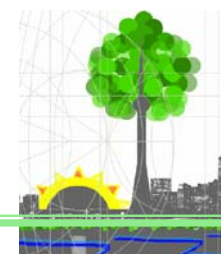
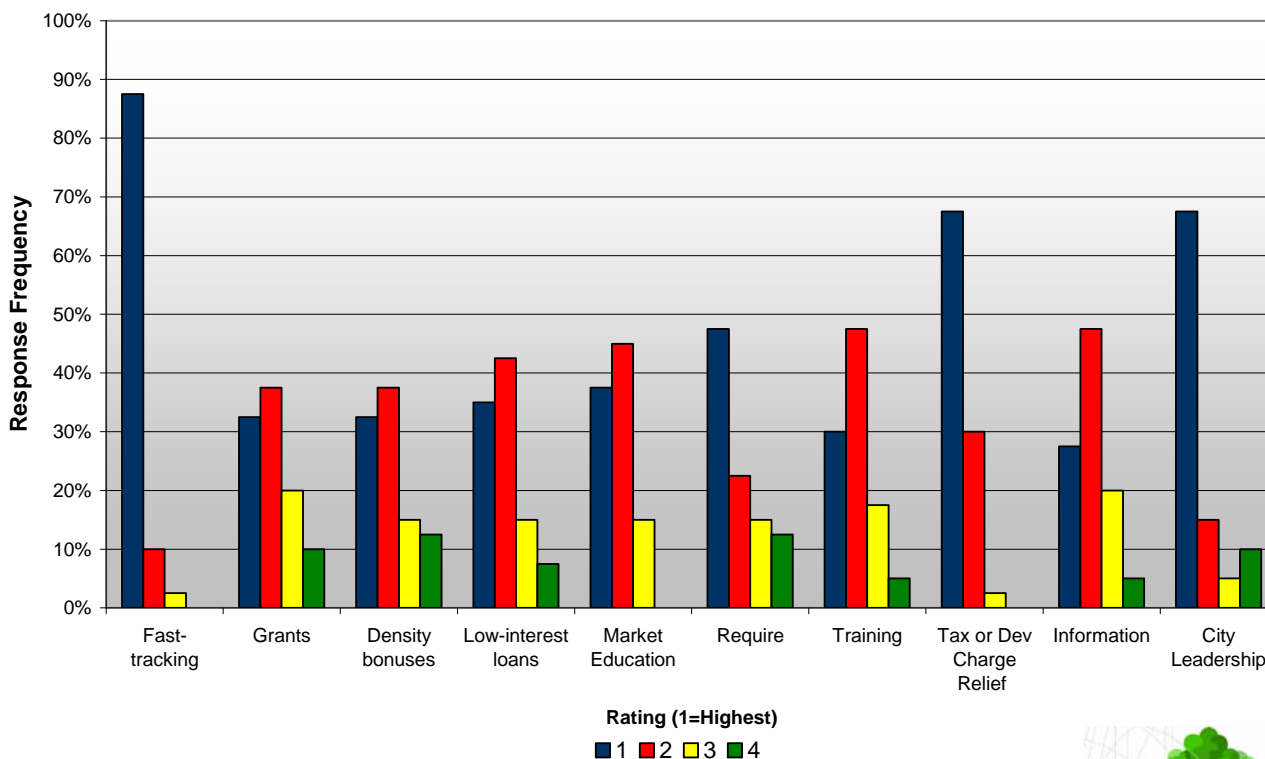
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## A.4 Workshop Feedback

The charts below show the breakdown of responses of workshop participants to different options to overcome the barriers to green development. Participants were provided with a list of possible solutions and rated them, with the highest rating being “1”, and the lowest rating being “4”.

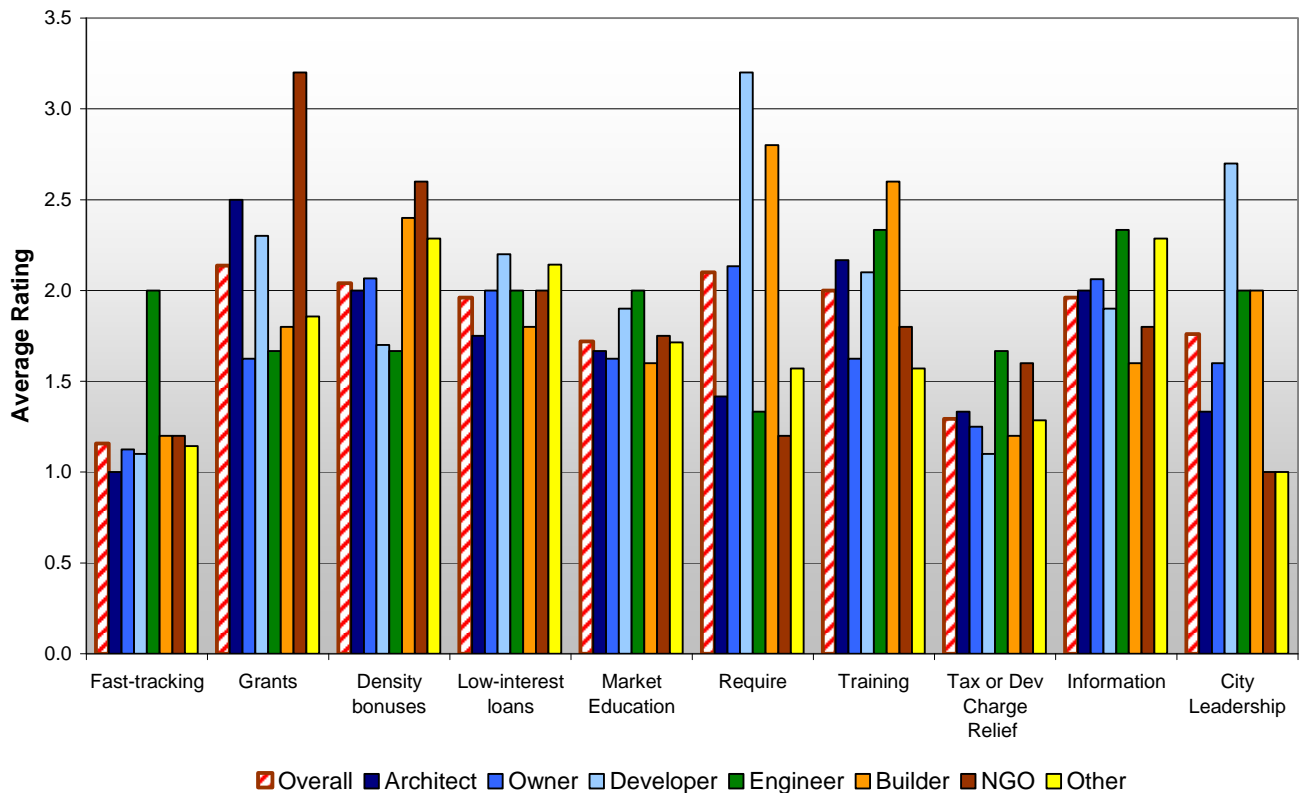
The first chart below is a frequency distribution of responses as per the ratings given to each solution. The second chart shows the breakdown of responses by sector. It is noteworthy that the small sample size means that the results portrayed in these charts are subject to be skewed by individual responses.

**GDS Implementation Solutions: Frequency Distribution of Ratings**



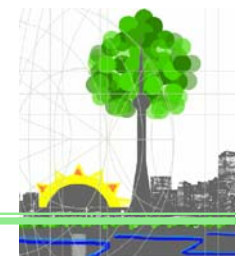
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## GDS Implementation Solutions: Breakdown by Sector



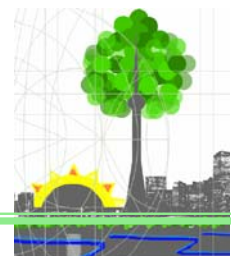
Workshop participants also included their own suggestions to address the barriers to green development which they had identified. These were not rated by other participants, so all additional suggestions are simply listed below:

- Metering should be posted in public buildings;
- The City should promote early adopters/pioneers in green development;
- Monitor costing of public green buildings (including design, construction and operation) to build up a knowledge base about costs versus benefits of green development;
- Tie incentive programs together to make it more easy to apply for incentives;
- If grants are provided for green development, the grants must be meaningful to the size and expense of the project to which it is applied;
- The City should pay for LEED verification;
- The City should work with the financial sector to encourage green mortgages;



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- Provide more information supporting the return on investment for green development;
- Focus on technologies that provide good return on investment and are already widely available (“state of the shelf”);
- Involve real estate agents to help facilitate public education (provide training that gives them the credits they need);
- Work with other municipalities in the GTA so that policies are harmonized.



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## A.5 Toronto Green Building Examples

### SAS Canada 280 King St E

(2005 - Norr Architects and Engineers)

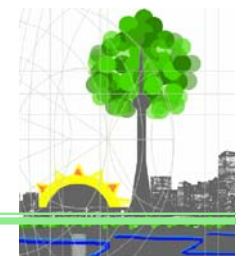
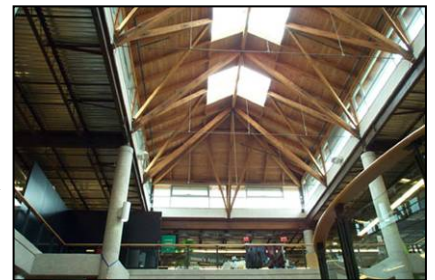
- Applying for LEED certification (anticipating Silver)
- 30 – 50% less energy consumption than comparable buildings achieved through high efficiency shell design, HVAC system, elevators, and fixtures
- Rainwater harvesting and treatment for use in flushing and washroom fixtures
- Light coloured roofing materials to reduce the urban heat island
- Individual environmental controls (temperature and lighting)
- Maximum day lighting through central atrium space, and floor to ceiling glass walls
- Recycled concrete
- Low VOC emitting, environmental friendly and locally sourced finishing materials
- Bicycle parking, showers and change room facilities
- Construction management programs to control air pollution



### Mountain Equipment Co-op 400 King St W

(1998 – Stone Kohn McQuire Vogt Architecture)

- Built pre-LEED but currently applying for certification
- Energy efficient design including HVAC system, computerized building management for lighting and thermal comfort, window glazing, wall and roof insulation, fluorescent lighting, office and washroom motion sensor lighting, LED exit signs
- Demonstration photo-voltaic electric generation
- Environmental friendly paints, flooring and finishing products
- Optimization of day lighting
- 900 square metre extensive green roof with native species
- Rainwater harvesting
- Planted street trees
- Re-used structural timbers, used recycled steel framing, steel components, wall and roof insulation, concrete, certified wood
- Local sourcing of materials
- Durable building design
- Cycling facilities, carpool parking spaces and participation in Autosshare program.



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## **Metro Label** 999 Progress Avenue (North Scarborough) (2005 – Barry Bryan and Associates with Enermodal Engineering Ltd)

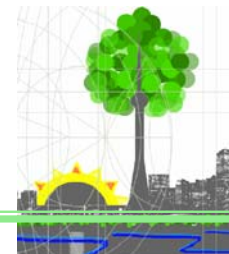
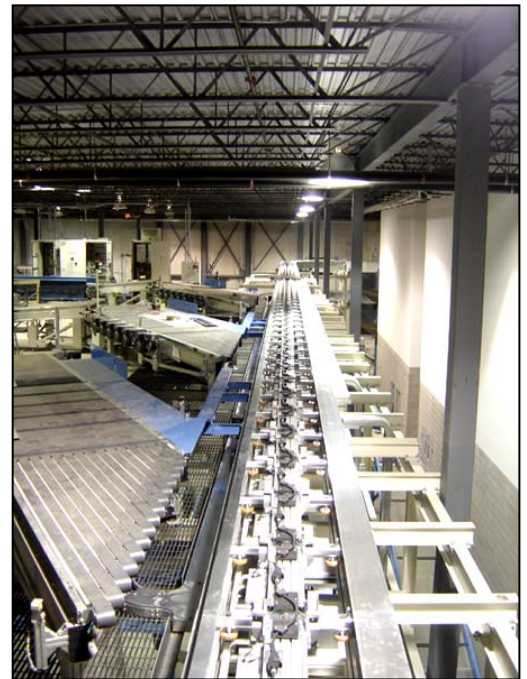
- Industrial building applying for LEED certification.
- Building oriented to maximize day lighting
- Harvest snow and rainwater to flush toilets
- Waterless urinals
- Insulated duct work
- Used materials made from recycled products and natural fibres
- Recycled 75% of construction waste including concrete, asphalt, paper and metal.
- Used EcoLogo paints and low VOC-emitting materials
- Cycling facilities (showers and lockers)
- High efficiency light fixtures, daylight sensors, and energy efficient building design to achieve a 34% improvement over the Model National Energy Code for Buildings
- Planted drought resistant shrubbery
- Located new plant in close proximity to old one to minimize additional travel for employees
- Installed a heat recovery system to recycle energy emitted from industrial processes.



## **CanPar** South Etobicoke employment lands

(2006 – Jacques Whitford and Maple Reindeers)

- Developed on a former brownfield site in co-operation with the Toronto Economic Development Corporation
- Industrial building applying for LEED certification
- Rainwater collection for use in bathrooms and landscaping irrigation
- Improved insulation to compensate for loading docks
- Mechanical exhaust system captures heat from vehicle exhaust and uses it to heat the building



# Appendices

## **Radiance Yonge and Sheppard**

(2006 – Minto Urban Communities)

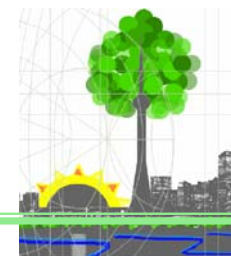
- LEED Silver Certified
- Building designed to be 33% more energy efficient than Model National Energy Code for Buildings, saving \$200,000 in common-area costs during the building's first year of occupancy.
- Innovative indoor air quality system which integrates a fan coil unit with a heat recovery ventilator.
- Waterless urinals and composting toilets.
- "All-off" energy switch in individual suites.
- Water meters in each suite which have resulted in 50% savings
- Located in close proximity to transit stations, provides secure storage for 200 bicycles, participates in autoshare program for use of hybrid car
- Used 40% local materials in construction
- Installed recycling chutes on each floor, reducing waste volume destined for landfills by 70%.



## **The Verve Wellesley and Jarvis**

(2005 – Tridel)

- Pursuing LEED certification
- Developed innovative financing method in partnership with the Toronto Atmospheric Fund
- Waterless urinals and composting toilets
- High efficiency faucets and showers
- Individual suite monitoring for electricity, water, heating and cooling
- Central heat recovery ventilator system
- Compact fluorescent lighting
- High efficiency Energy Star appliances
- Low maintenance plank floors
- Landscaped rooftop terrace
- Optimization of daylighting
- Recycling facilities
- Low VOC carpeting, wall coverings, adhesives, coatings and paints
- Durable building with use of salvaged and recycled materials



# Appendices

## York University: Computer Science Building

(2002 - Busby + Associates/ Van Nostrand Di Castri Architects)

- First sustainably designed academic building for a northern climate
- 50% more efficient than Model National Energy Code for Buildings (received a 2004 Ministry of Natural Resources Energy Efficiency Award)
- Extensive use of exposed 50% flyash concrete
- Sunshading devices to reduce passive solar gain
- Passive ventilation system with operable windows and thermal chimneys
- Environmentally friendly finishing materials
- Extensive green roof
- Atrium to allow for day lighting.



## York University: Pond Road Student Residence

(2004 – architectsAlliance)

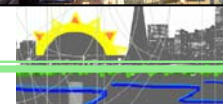
- First “green” student residence in Ontario
- In-slab heating and cooling that uses concrete structure as a heat sink
- High performance curtain wall with sunshade devices
- Heat recovery on all exhausts
- Green roof



## University of Toronto: Terrence Donnelly Centre for Cellular and Biomolecular Research

(2005 - Behnisch Architects with architectsAlliance)

- Multi-storey gardens that act as lungs for the building
- Naturally ventilated office / administration areas
- Exposed concrete to maximize heating and cooling efficiency
- Double glass façade to improve energy efficiency
- Daylighting



# Appendices

## Toronto Botanical Gardens

(2006 – Montgomery and Sisam)

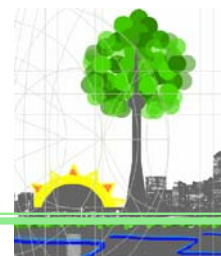
- Extensive green roof
- Used recycled materials
- Local manufactured materials
- High-efficiency mechanical equipment
- Captures and stores rainwater for use in irrigation
- Fritted glass, sunshading
- Reused stone and steel structure from old buildings
- 30% more energy efficiency than Model National Energy Code for Buildings
- Indigenous plants and landscaping.



## 401 Richmond

(Retrofit: 1994 to Present – urbanspace PROPERTY Group)

- Recycling separation and pick up
- Green roof (including food growing)
- Electronic Waste collection twice yearly
- Vermiculture and composting
- Promotion of Bike Use
- Green Globes audit – sets an environmental benchmark in terms of energy efficiency and performance metrics
- Energy retrofit – lighting
- One waterless urinal
- Heritage building - Ecologically restorative, making use of embodied energy.



## **CONTACT**

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